

⑫ 公開特許公報(A)

昭62-291362

⑤ Int. Cl.⁴E 04 F 15/18
C 08 K 7/04

識別記号

CAH
KCJ

庁内整理番号

7130-2E

④ 公開 昭和62年(1987)12月18日

C 08 L 101/00
E 04 F 15/10

1 0 4

A-6845-4J

7130-2E 審査請求 未請求 発明の数 1 (全5頁)

⑬ 発明の名称 導電性床

⑭ 特 願 昭61-137346

⑮ 出 願 昭61(1986)6月12日

⑯ 発 明 者 柑 本 哲 哉 長岡京市開田4丁目34番16号

⑰ 出 願 人 住友ゴム工業株式会社 神戸市中央区筒井町1丁目1番1号

明 細 書

1. 発明の名称

導 電 性 床

2. 特許請求の範囲

(1) 高分子バインダーと、これに混合される短小繊維状の導電材及び導電性充填材を含む組成物で形成される導電性床であって、前記短小繊維状の導電材が10 μ m以下の直径及び平均4mm以下の長さを有することを特徴とする導電性床。

(2) 短小繊維状の導電材が、組成物の全量中0.1~2.0重量%、好ましくは0.2~0.5重量%混合されると共に、導電性充填材が、組成物の全量中1.0~5.0重量%、好ましくは2.0~3.0重量%混合されている特許請求の範囲第1項記載の導電性床。

(3) 短小繊維状の導電材が、その全量中1.5mm以下の長さを有するものを5.0重量%以上含んでいる特許請求の範囲第2項記載の導電性床。

(4) 導電性床が約0.3~3mmの比較的厚膜とされている特許請求の範囲第1項ないし第3項

のいずれかに記載の導電性床。

3. 発明の詳細な説明

〔産業上の利用分野〕

本発明は、ゴム又は合成樹脂などの高分子バインダーに短小繊維状の導電材又は該繊維状導電材と粉粒状の導電材とを混入して成る組成物により構成される導電性床の改良に関する。

〔従来の技術〕

従来、手術室のような爆発性ガスを用いる場所やコンピューター室、IC組立工場等の静電気を嫌う場所に多用されている導電性床は、一般にゴム又は合成樹脂などにカーボンブラック、グラファイト等の主として黒色の導電性材料を混入して成る高分子組成物を下地面上に展延塗装することにより形成されているため、完成された導電床の色調は黒色か、精々黒灰色の所謂“雲流れ模様”程度のものに限られ、周囲の明るい室内雰囲気と調和せず、装飾的価値の劣ったものであった。

そこで、この欠点を解消するため、粉粒状又は鱗片状(フレーク)の各種金属片、銀ガラスビ-

ズ、酸化スズコートチタン白、導電性亜鉛華などの銀色または白色系統の導電材を使用することにより、淡色又は各種色調に着色することを可能にする技術も開発されている。しかし、上記いずれの場合にも実用上有効な導電性能を発揮しうするためには大量の導電材を混入する必要がある、そうすると、舗装用組成物の粘度が著しく増大するのでセルフレベルリング性が悪化し、特に厚膜（厚さ約0.3mm以上）の塗布床の場合、該組成物を平滑に敷き均らすことが困難となり、舗設後表面を研磨する必要が生じるなど施工手間が増大する。

そこでさらに、粉粒状又は鱗片状の導電材のほかに短小繊維状の導電材（例えば、炭素繊維や金属繊維など）を併用することにより、セルフレベルリング性を悪化させることなく有効な導電性能を発揮しうる導電性床が開発されている。

（発明が解決しようとする問題点）

しかし、上記繊維状導電材を併用した導電性床では、該繊維状導電材として一般に30μm以上と云う比較的太径のものが使用されているため、

該導電材が完成された床表面に斑模様ないしゴマ塩模様を呈出せしめ、床の外観に悪影響を及ぼす場合がある。また、繊維状導電材が他の粉粒状導電材との比重の相違や不適正な配合比率のため、床の上下いずれかの面に偏在する“浮上がり又は沈降現象”を出現させ、良好な導電性能を発揮しえなくなるもある。

そこで本発明は、上記問題点に解決を与え、優れた導電性、セルフレベルリング性及び外観を備えた導電性床を提供することを目的とする。

（問題点を解決するための手段）

本発明に係る導電性床は、上述問題点を解決するため、高分子バインダーと、これに混合される短小繊維状の導電材及び導電性充填材を含む組成物で形成される導電性床であって、前記短小繊維状の導電材が10μm以下の直径及び平均4mm以下の長さを有することを特徴とする。

高分子バインダーとしては、従来の導電性床の場合と同様にゴム又は合成樹脂が用いられるが、本発明の導電床では該バインダーの他、繊維状の

導電材及び粉粒状の導電性充填剤を含む粘稠な舗設材料を下地面上に展延塗装して完成される関係上、該バインダーは自然条件の下で比較的早期に固化しうるものであるのが望ましい。そのため、該バインダーとして、好ましくはエポキシ樹脂、ポリウレタン樹脂、不飽和ポリエステル樹脂、アクリル系樹脂及びこれらの変性物（例えば、エポキシ変性不飽和ポリエステル樹脂）等の常温硬化型樹脂が用いられる。

本発明では先述のごとく、極く微細かつ微小な繊維状の導電材（炭素繊維や金属繊維など）が使用されるが、本発明の好ましい実施態様によれば、舗設用組成物が、前記導電材を0.1～2.0重量%の範囲で含有し、かつ該導電材の全量中に1.5mm以下の長さを有するものを50重量%以上含むよう調製され、これにより後述する実施例に示すごとく優れた外観及びセルフレベルリング性を備え、かつ有効な導電性能を発揮しうる導電性床が得られる。また、前記導電材が短い（約1mm以下）場合には若干多い目（組成物に対して約0.2wt%

以上）に、また長い（約2mm以上）の場合には若干少ない目（組成物に対して約1.0wt%以下）に混合するのが望ましい。

本発明の導電性床を構成する舗設用組成物には、上記導電材に有効な導電性能を発揮せしめるため、及び該舗設用組成物に優れたセルフレベルリング性を付与するために適切な量の導電性充填材が混合される。この充填材の最適量は、該舗設用組成物の全量中10～50重量%、好ましくは20～30重量%の範囲である。この範囲内であれば、先述した繊維状導電材の“浮上がり現象”又は“沈降現象”を防止して有効な導電性能を発揮せしめ得ると共に、床表面の平滑仕上げが容易に行いうる。なお、該導電性充填材としては、微粒グラファイトのほか、銅、錫、アルミニウム、ステンレス鋼などの金属粉末や銀ガラスビーズ、酸化スズコートチタン白、導電性亜鉛華などが用いられるが、従来技術の項で紹介した通り、淡色調もしくは明色調の導電性床として仕上げる場合には後者の銀色もしくは白色の充填材を用いるのが好ま

しい。また、本発明は厚みが約0.3mm以上の比較的厚膜とされる導電性床に適用される場合に効果的である。

〔作 用〕

本発明の導電性床では、以上概説した通り、従来の導電性床に用いられてきた導電材と比べて極く微細かつ微小の繊維状の導電材が使用されるので、後に実施例を掲げて詳説するごとく、完成された導電性床の表面上肉眼では全く認識されず、特に淡色調もしくは明色調のものである場合に好ましい外観の導電性床が得られ、しかも好ましい実施態様として述べたように特定範囲の量の導電性充填材と併用することにより、前記導電材が床面内に均等に分散されて有効な導電性能を発揮すると共に、舗設用組成物が好適な粘度に調製されるため、表面平滑な導電性床を容易に施工することができる。

〔実 施 例〕

以下、本発明の実施例について説明すると、本発明の作用効果を確認するため、表-1に示す通

り、19種の組成物を調製し、それら組成物を用いて夫々導電床を模型的に形成した上、後述の導電性試験及び外観テストを行った。

- (以下17行余白) -

〔表-1〕(1)

組 成 (部)	試 料 番 号				
	1	2	3	4	5
エポコート815※1	100	100	100	100	100
導電性亜鉛華 ※2	50	50	50	50	50
ステンレス繊維 4μmφ・平均長4mm	0.5	-	-	-	-
“ ” “ ” 2mm	-	0.5	1.0	-	-
“ ” “ ” 1mm	-	-	-	0.5	1.0
カーボン繊維 9μmφ・平均長2mm	-	-	-	-	-
沈降性硫酸バリウム	-	-	-	-	-
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
EH220 ※3	50	50	50	50	50
2mm厚電気抵抗値 Ω	2×10^4	8×10^5	1×10^5	∞	1×10^7
外 観 評 価	不良	良	僅かに繊維の塊りを認める	良	良

※1-油化シエルエポキシ樹脂製エポキシ樹脂、 ※2-白水化学工業「23-K」
※3-旭電化工業製硬化剤。

〔表-1〕(2)

組 成 (部)	試 料 番 号				
	6	7	8	9	10
エポコート815※1	100	100	100	100	100
導電性亜鉛華 ※2	50	50	50	50	50
ステンレス繊維 4μmφ・平均長4mm	-	-	-	-	-
“ ” “ ” 2mm	-	-	0.1	0.2	-
“ ” “ ” 1mm	2.0	3.0	0.4	0.3	-
カーボン繊維 9μmφ・平均長2mm	-	-	-	-	1.0
沈降性硫酸バリウム	-	-	-	-	-
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
EH220 ※3	50	50	50	50	50
2mm厚電気抵抗値 Ω	1×10^6	5×10^5	2×10^6	1×10^5	3×10^5
外 観 評 価	良	良	良	良	良

〔表—1〕(3)

組 成 (部)	試 料 番 号				
	1 1	1 2	1 3	1 4	1 5
エポコート815※1	100	100	100	100	100
導電性亜鉛華 ※2	10	20	100	120	25
ステンレス繊維 4 μ m ϕ ・平均長4mm	—	—	—	—	—
— “ — “ 2mm	0.1	0.1	0.1	0.1	0.1
— “ — “ 1mm	0.4	0.4	0.4	0.4	0.4
カーボン繊維 9 μ m ϕ ・平均長2mm	—	—	—	—	—
沈降性硫酸バリウム	—	—	—	—	25
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
EH220 ※3	50	50	50	50	50
2mm厚電気抵抗値 Ω	∞	1×10^7	1×10^6	1×10^6	5×10^6
外 観 評 価	良	良	良	不良	良

〔評 価 方 法〕

本発明で採用した導電性試験は、NFPA (National Fire Protection Association) 規格 56-Aに準拠しているが、この規格では被測定床面の断面厚み方向の測定に関しては規定されていないため、本発明では第1図に示すごとく、該規格で採用されている“メガー”と呼ばれる絶縁抵抗計(1)と直径6.4cmの電極(2,2')を用い、該電極(2,2')を厚み2mmとされた各試料体(3)の表裏両面に、好ましくは同軸的に配置し、測定して得た電気抵抗値を、人体に安全と云われる電気抵抗値($10^4 \sim 10^7 \Omega$)と比較することにより導電性能の評価を行った。

一方、外観試験は各試料について目視により繊維状導電材の認否、分散状況及び床表面の平滑状態を観察して夫々評価したもので、前記導電材の存在及び床表面の微細凹凸などの欠陥が肉眼では全く認識できなかったものを「良」とした。

〔試 験 結 果〕

表-1のデータから、本発明に基いて10 μ m

〔表—1〕(4)

組 成 (部)	試 料 番 号			
	1 6	1 7	1 8	1 9
エポコート815※1	100	100	100	100
導電性亜鉛華 ※2	—	50	50	—
ステンレス繊維 50 μ m ϕ ・平均長2mm	—	1.0	—	—
8 μ m ϕ ・ “ 2mm	—	—	1.0	—
4 μ m ϕ ・ “ 4mm	—	—	—	—
— “ — “ 2mm	1.0	—	—	0.1
— “ — “ 1mm	—	—	—	0.4
カーボン繊維 9 μ m ϕ ・平均長2mm	—	—	—	—
導電性チタン白	—	—	—	50
添 加 剤	1	1	1	1
顔 料	10	10	10	10
EH220 ※3	50	50	50	50
2mm厚電気抵抗値 Ω	∞	5×10^5	3×10^5	1×10^6
外 観 評 価	良	不良	良	良

ϕ 以下で、かつ平均長4mm以下の短小繊維状導電材を用いた試料№2～10, 12, 13, 15, 16, 18及び19のものでは、電気抵抗値が全て先述の基準値範囲内にある上、殆どの試料で外観も「良」と評価できた。但し、試料№3のものでは僅かに導電性繊維の塊りが認められたが、導電性能が良好であることを勘案すれば、実用上差し障りはないと判断した。

以上に対して試料№1のものは導電性繊維の平均長が長いために外観が悪く、また試料№11のものは導電性充填材の配合量が少ないために導電性能が劣ったものとなっている。さらに、試料№14のものは導電性充填材の配合量が多すぎるため、組成物の粘度が高くなり表面平滑性の点で劣ったものとなり、試料№17のものでは導電性繊維の直径が太過ぎる(50 μ m)ため、床表面に該繊維が浮き出て散見された。

〔発明の効果〕

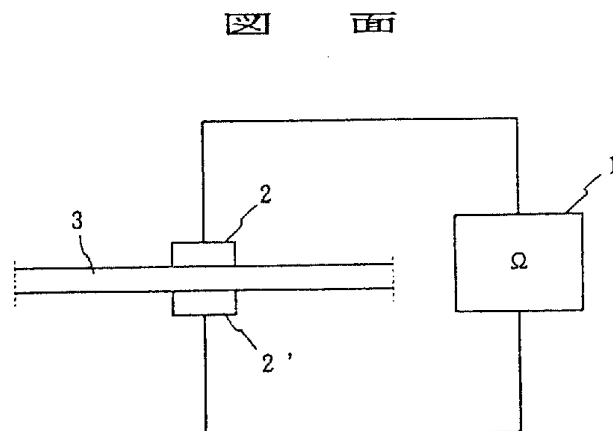
本発明は、以上実施例を掲げて詳述した通り、極く微細かつ微小の導電性繊維を特定量の導電性

充填材と併用することにより、優れた導電性、セルフレベルリング性及び外観を備えた導電性床を提供することができる。

4. 図面の簡単な説明

図面は本発明に係る導電性床の導電性試験方法を示す概略図である。図面中の符号の意味は以下の通り。――

1：絶縁抵抗計、2、2'：電極、3：試料体。



特許出願人 住友ゴム工業株式会社

10/596,261

PTO 08-1291

CC=JP DATE=19871218 KIND=A
PN=62291362

ELECTRICALLY-CONDUCTIVE FLOOR
[Dodensei yuka]

Tetsuya Kojimoto

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. December 2007

Translated by: FLS, Inc.

PUBLICATION COUNTRY (19): JP

DOCUMENT NUMBER (11): 62291362

DOCUMENT KIND (12): A

PUBLICATION DATE (43): 19871218

APPLICATION NUMBER (21): 61137346

APPLICATION DATE (22): 19860612

INTERNATIONAL CLASSIFICATION (51): E04F 15/18; C08K 7/04; C08L
101/00; E04F 15/10

INVENTORS (72): KOJIMOTO, TETSUYA

APPLICANT (71): SUMITOMO RUBBER INDUSTRIES, LTD.

TITLE (54): ELECTRICALLY-CONDUCTIVE FLOOR

FOREIGN TITLE [54A]: DODENSEI YUKA

1. Title of Invention

Electrically-Conductive Floor

2. Claim(s)

(1) An electrically-conductive floor formed from a composition comprising a polymer binder, an electrically-conductive material of small, short fibers, and an electrically-conductive filler; said electrically-conductive floor characterized by the diameter of the aforesaid electrically-conductive material of short fibers being 10 μ m or less and the average length thereof being 4 mm or less.

(2) The electrically-conductive floor of Claim 1 wherein the electrically-conductive material of small, short fibers is mixed in an amount of 0.1 to 2.0% by weight, and preferably, 0.2 to 0.5% by weight of the total amount of composition, and also, the electrically-conductive filler is mixed in an amount of 1.0 to 50% by weight, and preferably, 20 to 30% by weight of the total amount of the composition.

(3) The electrically-conductive material of small, short fibers of Claim 2 wherein the electrically-conductive material of small, short fibers having a length of 1.5 mm or less is contained in an amount of 50% by weight or more of the total amount thereof.

*Numbers in the margin indicate pagination in the foreign text.

(4) The electrically-conductive floor of any of Claims 1 to 3 wherein the electrically-conductive floor is a relatively thick film about 0.3 to 3 mm thick.

3. Detailed Specifications

(Field of Industrial Application)

The present invention relates to an improvement in an electrically-conductive floor composed by mixing an electrically-conductive material of small, short fibers and an electrically-conductive material of such a fibrous electrically-conductive material and a powdered electrically-conductive material with a polymer binder, such as a rubber or a synthetic resin.

(Prior Art)

Conductive floors, which are used mostly in areas employing explosive gases, such as operating rooms, and areas where static electricity builds up, such as computer rooms and plants where ICs are assembled, have been formed by applying a polymer composition by spreading it on a base surface. This polymer composition is generally comprised by primarily mixing a black electrically-conductive material, such as carbon black or graphite, on rubber, a synthetic resin, and the like with a rubber or a synthetic resin; hence, the color tone of a completed electrically-conductive floor is limited to black or a so-called cloud-stream pattern of blackish gray colors at best, which does not harmonize with a bright ambient indoor atmosphere, and the decorative value declines.

Therefore, to solve this drawback, an art enabling a floor to be colored with light colors or various color tones by using silver or white electrically-conductive materials, such as various powdered or scaly (flaky) metal pieces, silver glass beads, tin oxide-coated titanium white, and electrically-conductive zinc oxides, also is under development. In either case, however, it is necessary to mix a large amount of electrically-conductive material to manifest an effective, practical electrical conduction performance. Since the viscosity of the decorative composition then increases markedly, the self-leveling properties degrade. In particular, in the case of a floor with a thick coat (thickness: about 0.3 mm or longer), it is difficult to evenly spread this composition smoothly, and the construction time and labor increase because of the need to polish the surface after overlaying. /2

Therefore, by jointly using an electrically-conductive material of small, short fibers in addition to a powdered or scaly electrically-conductive material (e.g., carbon fibers, metal fibers, etc.), and an electrically-conductive floor with the ability to manifest an effective electrical conduction performance without exacerbating the self-leveling properties has been developed.

(Problems to be Solved by the Invention)

However, with an electrically-conductive floor wherein the above-mentioned fibrous electrically-conductive filler is jointly used, said fibrous electrical conduction material having a relatively

large diameter, generally 30 μm or greater, is used; hence, this electrically-conductive material may present a mottled or salt-and-pepper pattern on the completed floor surface, which adversely affects the floor's appearance. In addition, due to the difference in the specific gravity between the fibrous electrically-conductive material and the additional powdered electrically-conductive material or due to an inappropriate compounding ratio, a "floating or sinking phenomenon" may emerge and a satisfactory electrical conduction performance cannot be manifested.

Therefore, it is an object of the present invention to provide a solution to the above-mentioned problem and provide an electrically-conductive floor which is provided with outstanding electrical conductivity, self-leveling properties and appearance.

(Means for Solving the Problems)

The electrically-conductive floor pertaining to the present invention solves the aforementioned problems; hence, it is an electrically-conductive floor formed from a composition comprising a polymer binder, an electrically-conductive material of small, short fibers, and an electrically-conductive filler; and is characterized by the diameter of the aforesaid electrically-conductive material of short fibers being 10 μm or less and the average length thereof being 4 mm or less.

Although a rubber or synthetic resin can be employed for the polymer binder, as in the case of a conventional electrically-

conductive floor, with the electrically-conductive floor of the present invention, it is favorable to spread and apply, in addition to the binder, a viscous overlaying material containing a fibrous electrically-conductive material and a powdered electrically-conductive filler, and to allow this binder to be solidified in the relatively early stage under natural conditions. Therefore, resins which cure at normal temperature, such as an epoxy resin, polyurethane resin, unsaturated polyester resin, acrylic resin, and their modified products (e.g., epoxy-denatured unsaturated polyester resin), are preferably employed.

In the present invention, as stated previously, a very fine, microscopic fibrous electrically-conductive material (carbon fibers, metal fibers, etc.) are used, but according to a preferred embodiment of the present invention, the composition for overlaying contains a range of from 0.1 to 2.0% by weight of the aforesaid electrically-conductive material, and is so prepared to contain an electrically-conductive fiber having a length of 1.5 mm or less in an amount of 50% by weight or more of the total amount of the electrically-conductive material. Thus, an electrically-conductive material which is provided with outstanding appearance and self-leveling properties, and is able to manifest an effective electrical conduction performance is obtained, as shown in the practical examples stated later. In addition, when the aforesaid electrically-conductive material is short (about 1 mm or shorter), it is favorable to mix a

slightly excessive amount thereof (about 0.2% by weight or more of the composition), and moreover, when it is long (about 2 mm or longer), it is favorable to mix a slightly deficient amount thereof (about 1.0% by weight or less of the composition).

In order for the above-mentioned electrically-conductive material to manifest an effective electrical conduction performance, a suitable amount of an electrically-conductive filler is mixed with the composition for overlaying that makes up the electrically-conductive floor of the present invention to impart this composition for overlaying with outstanding self-leveling properties. The most suitable amount of this filler falls in a range of from 10 to 50% by weight, and preferably, 20 to 30% by weight of the total amount of this overlaying composition. As long as the amount is within this range, the "floating phenomenon" or "sinking phenomenon" of the previously-described fibrous electrically-conductive material is prevented, an effective electrical conduction performance can be manifested, and also, a smooth finishing of the floor surface can be performed with ease. Moreover, besides a particulate graphite, a metal powder, such as a copper, tin, aluminum, or stainless steel powder, silver glass beads, tin oxide-coated titanium white, electrically-conductive zinc oxide, and the like can be employed for the electrically-conductive filler, but as was introduced in the paragraph regarding prior art, when finished as an electrically-

conductive floor having a light or bright color tone, it is preferable to employ the latter silver or white fillers. In addition, the present invention is effective when it is applied to an /3
electrically-conductive floor where a relatively thick film of about 0.3 mm or longer is obtained.

(Effects)

With the electrically-conductive floor of the present invention, as outlined above, since a much finer and more microscopic fibrous electrically-conductive material than an electrically-conductive material employed in a conventional electrically-conductive floor is used, as described in detail by citing practical examples later, this material cannot be recognized at all on the surface of a completed electrically-conductive floor with the naked eye. In particular, when it has a light or bright color tone, an electrically-conductive floor having the preferred appearance is obtained, and moreover, by jointly using an amount of the electrically-conductive filler in a prescribed range, as described above, in a preferred embodiment, the aforesaid electrically-conductive material is dispersed evenly within the floor surface to manifest an effective electrical conduction performance, and also, a composition for overlaying is prepared with the ideal viscosity; hence, an electrically-conductive floor having surface smoothness can be carried out with ease.

(Practical Examples)

The practical examples of the present invention will now be described. To confirm the effects and advantages of the present invention, nineteen compositions were prepared, as shown in Table 1, and these compositions were used to form typical electrically-conductive floors, respectively, after which the conductivity test and appearance tests described later were performed.

(Table 1) (1 of 4)

組 成 (部)	試 料 番 号				
	1	2	3	4	5
エポコート 815 ※1	100	100	100	100	100
導電性亜鉛塵 ※2	50	50	50	50	50
ステンレス粉塵 4 μm φ・平均長 4 mm	0.5	—	—	—	—
— — — 2 mm	—	0.5	1.0	—	—
— — — 1 mm	—	—	—	0.5	1.0
カーボン粉塵 9 μm φ・平均長 2 mm	—	—	—	—	—
沈降性硫酸バリウム	—	—	—	—	—
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
E11220 ※3	50	50	50	50	50
2 mm厚電気抵抗値 Ω	2×10^4	8×10^5	1×10^5	∞	1×10^7
外 観 評 価	不良	良	僅かに結塊の塊りを認める	良	良

※1 - 高化シエールエポキシ樹脂型エポキシ樹脂、 ※2 - 白水化学製「23-K」
 ※3 - 旭電化製導電化剤。

Key:

Composition (parts)	Sample No.				
Epikote 815 ^{*1} Conductive zinc oxide ^{*2} Stainless steel fibers 4 µm dia.; average length: 4 mm " " . " " : 2 mm " " ; " " : 1 mm Carbon fibers 9 µm dia.; average length: 2 mm Precipitated barium sulfate Additive Pigment EH220 ^{*3}					
2 mm thick electrical resistance Ω					
Evaluation of appearance	Unsatisfactory	Satisfactory	Some fiber clumps obvious	Satisfactory	Satisfactory

^{*1}: epoxy resin, available from Yuka-Shell Epoxy Co., Ltd.; ^{*2}: "23-K,"

available from Hakusui Chemical Industries Ltd.; ^{*3}: Curing agent,

available from Asahi Denka Co., Ltd.

(Table 1) (2 of 4)

組 成 (g)	試 料 番 号				
	6	7	8	9	10
エポコート 815 ※1	100	100	100	100	100
導電性亜鉛粉 ※2	50	50	50	50	50
ステンレス繊維 4 μm φ・平均長 4 mm	—	—	—	—	—
— “ “ “ “ 2 mm	—	—	0.1	0.2	—
— “ “ “ “ “ 1 mm	2.5	3.0	0.4	0.3	—
カーボン繊維 9 μm φ・平均長 2 mm	—	—	—	—	1.0
沈降性硫酸バリウム	—	—	—	—	—
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
EH220 ※3	50	50	50	50	50
2 mm厚電気抵抗値 Ω	1×10^4	5×10^3	2×10^4	1×10^4	3×10^3
外 観 評 価	良	良	良	良	良

Key:

Composition (parts)	Sample No.				
Epikote 815 ^{*1} Conductive zinc oxide ^{*2} Stainless steel fibers 4 μm dia.; average length: 4 mm “ “ ; “ “ : 2 mm “ “ ; “ “ : 1 mm Carbon fibers 9 μm dia.; average length: 2 mm Precipitated barium sulfate Additive Pigment EH220 ^{*3}					
2 mm thick electrical resistance Ω					
Evaluation of appearance	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory

(Table 1) (3 of 4)

/4

組 成 (部)	試 料 番 号				
	1 1	1 2	1 3	1 4	1 5
エポコート 815 ※1	100	100	100	100	100
導電性亜鉛粉 ※2	10	20	100	120	25
ステンレス繊維 4 μm φ・平均長 4 mm	—	—	—	—	—
— “ “ “ 2 mm	0.1	0.1	0.1	0.1	0.1
— “ “ “ 1 mm	0.4	0.4	0.4	0.4	0.4
カーボン繊維 9 μm φ・平均長 2 mm	—	—	—	—	—
沈降性硫酸バリウム	—	—	—	—	25
添 加 剤	1	1	1	1	1
顔 料	10	10	10	10	10
EH220 ※3	50	50	50	50	50
2 mm厚電気抵抗値 Ω	∞	1×10^7	1×10^8	1×10^6	5×10^6
外 観 評 価	良	良	良	不良	良

Key:

Composition (parts)	Sample No.				
Epikote 815 ^{*1}					
Conductive zinc oxide ^{*2}					
Stainless steel fibers					
4 μm dia.; average length: 4 mm					
“ “ ; “ “ : 2 mm					
“ “ . “ “ : 1 mm					
Carbon fibers					
9 μm dia.; average length: 2 mm					
Precipitated barium sulfate					
Additive					
Pigment					
EH220 ^{*3}					
2 mm thick electrical resistance Ω					
Evaluation of appearance	Satisfactory	Satisfactory	Satisfactory	Unsatisfactory	Satisfactory

(Table 1) (4 of 4)

組 成 (部)	試 料 番 号			
	16	17	18	19
エポコート 815※1	100	100	100	100
導電性亜鉛酸 ※2	—	50	50	—
ステンレス繊維 50 μm φ・平均長 2 mm	—	1.0	—	—
8 μm φ・ " 2 mm	—	—	1.0	—
4 μm φ・ " 4 mm	—	—	—	—
" " " " 2 mm	1.0	—	—	0.1
" " " " 1 mm	—	—	—	0.4
カーボン繊維 9 μm φ・平均長 2 mm	—	—	—	—
導電性チタン白	—	—	—	50
添 加 剤	1	1	1	1
顔 料	10	10	10	10
EH220 ※3	50	50	50	50
2 mm厚電気抵抗値 Ω	∞	5×10^8	3×10^8	1×10^9
外 観 評 価	良	不良	良	良

Key:

Composition (parts)	Sample No.			
Epikote 815 ^{*1}				
Conductive zinc oxide ^{*2}				
Stainless steel fibers				
50 μm dia.; average length: 2 mm				
8 μm dia.; " " : 2 mm				
4 μm dia.; " " : 4 mm				
" " " " : 2 mm				
" " " " : 1 mm				
Carbon fibers				
9 μm dia.; average length: 2 mm				
Electrically-conductive titanium white				
Additive				
Pigment				
EH220 ^{*3}				
2 mm thick electrical resistance Ω				
Evaluation of appearance	Satisfactory	Unsatisfactory	Satisfactory	Satisfactory

(Evaluation Methods)

The conductivity test adopted in the present invention was stipulated under the N F P A (National Fire Protection Association) 56-A standard, but since it has been stipulated with regards to measurement of the cross-sectional perpendicular direction of the surface of the floor to be measured in this evaluation, according to the present invention, as shown in Figure 1, an insulation resistometer 1, referred to as a "Megger," and 6.4 cm diameter electrodes 2 and 2' adopted according to this standard were employed to evaluate the electrical conduction performance by arranging them, preferably coaxially, on both the front and back sides of each sample 3 where the thickness of the electrodes 2 and 2' was defined as 2 mm, and comparing the resultant electrical resistance thus measured at an electrical resistance "safe for the human body" (10^4 to $10^7 \Omega$).

Meanwhile, the appearance test was conducted respectively by visually approving/disapproving the fibrous electrically-conductive material of each sample and observing the dispersed condition thereof and the state of the smoothness of the floor surface. Flaws, such as the presence of the aforesaid electrically-conductive material and fine irregularities on the floor surface that could not be recognized at all by the unaided eye were determined to be "good."

(Test Results)

According to the data in Table 1, the appearance of almost all of the samples could be evaluated as "good" as the electrical

resistance fell within the previously-mentioned standard value range for sample nos. 2 to 10, 12, 13, 15, 16, 18 and 19 employing short, small fibrous electrically-conductive material having a diameter of 10 μm or less and an average diameter of 4 mm or shorter, based on the present invention. However, although electrically-conductive fiber clumps were slightly obvious with sample no. 3, upon taking into consideration the excellent electrical conduction performance, it was judged that it was not adversely affected from a practical standpoint.

Vis-à-vis, since the appearance of the electrically-conductive fibers of sample no. 1 was poor because the average length of the fibers was long, and moreover, since the amount of the electrically-conductive filler of sample no. 11 was low, the electrical conduction performance was inferior. Furthermore, since the amount of the electrically-conductive filler of sample no. 14 was too high, the viscosity of the composition was high, so the surface smoothness was inferior. And since the diameter of the electrically-conductive fibers of sample no. 17 was too fat (50 μm), it appeared that these fibers floated on the floor surface like an optical illusion.

(Advantages of the Invention)

As described in detail above by citing the practical examples, in the present invention can be provided an electrically-conductive floor which is equipped with outstanding electrical conductivity,

self-leveling properties and appearance by combining the use of very fine, small electrically-conductive fibers with a prescribed amount of an electrically-conductive filler.

4. Brief Description of the Drawing

The drawing is a schematic view of the conductivity test method of the electrically-conductive floor pertaining to the present invention. The meanings of the codes in the drawing are as follows.

1: insulation resistometer; 2, 2': electrodes; 3: sample

Drawing

